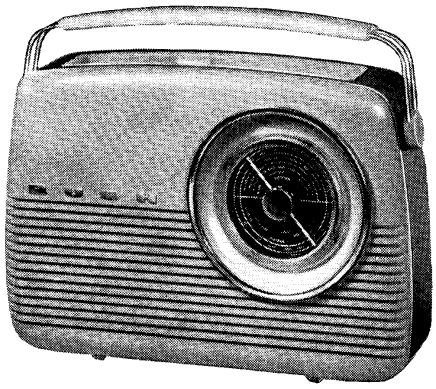
BUSH SERVICE INFORMATION

MODELS

TR82C & TR82D (Mk II)

TRANSISTOR-PORTABLE RADIO RECEIVERS



GENERAL DESCRIPTION

GENERAL

The TR82C and TR82D are electrically the same and except where otherwise stated the information contained in this manual applies to both. Both are two-waveband battery-operated receivers using seven transistors and one crystal diode.

CABINET

Both receivers have a moulded 3-piece plastic cabinet.

The TR82C is finished in blue and chrome.

The TR82D is finished in light tan and chrome.

DIMENSIONS (including handle)

Height	$10\frac{3}{4}$ in. (27·3 cm.)
Width	$13\frac{1}{2}$ in. (34 cm.)
Depth	$3\frac{3}{4}$ in. (9·5 cm.)
Weight	$7\frac{1}{4}$ lb. (3·3 kg.)

SPECIFICATION

CONTROLS

In the recess at the top of the case: from left to right: Volume control, two-push-button wave-change switch, Tone control and On/off switch.

The tuning control is on the front.

BATTERY

Ever Ready	PP9 or
Vidor	VT9 or
Drydex	DT9

CONSUMPTION

20-30 mA on an average programme and varying according to Volume control setting (class B output stage).

INTERMEDIATE FREQUENCY

470 kc/s.

SOUND OUTPUT

325 mW at 10% distortion.

LOUDSPEAKER

5 in. circular, 13,000 lines flux density. There is provision for the connection of an external speaker which must be of 3 ohms impedance, via the earphone socket. Connection of an external loudspeaker or an earpiece automatically cuts out the internal speaker.

WAVEBANDS

M.W. 187 to 570 metres (1,605 to 525 kc/s).
L.W. 1,070 to 1,900 metres (280 to 158 kc/s).

AERIAL

An internal ferrite-rod aerial is fitted for use on both wavebands.

There is also provision for connecting an external aerial. This is intended to be used for connecting to the car aerial when the receiver is used in a car.

TRANSISTORS

Mullard type:—

AF117	mixer/oscillator
AF117	i.f. amplifier
AF117	i.f. amplifier
OC71	audio amplifier
OC81D	driver
OC81	push-pull output (these are a balanced pair and if replacement is necessary both must be replaced at the same time).
OC81	

CRYSTAL DIODE

OA90 detector.

EARPIECE

A socket is provided for the connection of an earpiece the impedance of which should be of the order of 300 ohms. (See also under loudspeaker).

TRANSISTORS

GENERAL

Transistors may be expected to last indefinitely if used under the correct conditions and handled carefully.

The transistors may be damaged if the junction temperature rises above certain limits. Generally these limits are 75°C for continuous operation or 90°C for intermittent operation.

The junction temperature is the resultant of (1) the heat generated at the junction and (2) the ambient temperature.

This receiver is designed so that it may be safely operated over long periods in an ambient temperature of up to 40°C (105°F) without any risk of damage to the transistors. This represents a safe margin for a receiver used in the United Kingdom.

SERVICING HINTS

When soldering transistors grip the lead between the joint and the transistor with a pair of pliers as a heat sink. Use a small iron with a small thermal capacity. Do not bend the leads close to the transistor.

Do not remove or attach a transistor with the potential applied.

Exceeding the rated dissipation can produce a rise in temperature sufficient to destroy the junction. When checking the operating point of a transistor it is advisable to meter the collector current and the collector to emitter voltage.

It is not advisable to use an ohmmeter to check transistors. Some ohmmeters will cause excessive collector current and destroy the transistor. If it is necessary to use an ohmmeter the correct polarity must be observed and the full-scale current of the range used must be 1 mA or less. To illustrate this, the consumption on the 100Ω range on an AVO model eight at full-scale deflection is approximately 70 mA.

REMOVING CHASSIS FROM CABINET

Loosen the large screw in the centre of the cabinet back and remove the back.

Disconnect and remove the battery.

Remove the Tuning knob and the pointer from the front of the cabinet.

The Tuning knob is difficult to grip with the hand and a useful tool for this purpose is a rubber suction-pad sink cleaner. The pad is pressed on the knob and the knob may then be removed without straining it unduly.

Loosen and remove the four chassis-retaining screws.

Lift the chassis out of the cabinet from the bottom allowing the control knobs and tuning spindle to clear their respective holes.

When the pointer is replaced turn the tuning-capacitor spindle until the vanes are fully meshed and then line up the pointer with the datum line on the scale.

ALIGNMENT PROCEDURE

PRELIMINARY NOTES

1 Equipment required:—

(i) A signal generator with a frequency range of 214 kc/s to 1,500 kc/s modulated 30% at 400 c/s.

(ii) An output wattmeter with a range of 0-500 mW.

(iii) A special non-ferrous trimming tool suitable for adjusting the IFT and oscillator cores.

(iv) An Avometer model 8.

2 The r.f. and oscillator circuits must be aligned with the chassis in the case. For i.f. alignment the chassis must be taken out of the case.

3 The signal generator should be switched on about 15 minutes before beginning the alignment.

4 Set the receiver Volume control to maximum and the Tone control to maximum top response and use the lowest input from the signal generator consistent with a reasonable output from the receiver (approx. 50 mW).

I.F. ALIGNMENT

Note: The outer peak is the correct one for all IFT adjustments.

1 Switch the receiver to M.W. band and set the Tuning control to approximately 300 metres.

2 Set the signal generator to 470 kc/s modulated 30% at 400 c/s. Connect the output via a 0·1μF blocking capacitor to the test point located on the chassis above VT1 and align IFT3, IFT2 and IFT1 in that order for maximum audio output.

Align each IFT once only.

R.F. ALIGNMENT

Note: Under conditions of interference, the receiver may be temporarily desensitised by connecting an 8·2k resistor across C21 (8mfd). Couple the signal generator to the receiver by a loop of insulated wire placed 2-3 feet from the chassis and with the plane of the loop at right angles to the ferrite rod aerial. For final calibration, remove the desensitising resistor if fitted previously.

Operation	Waveband	Signal Generator Frequency	Receiver Setting	Adjustment (for maximum output)
1	M.W.	600 kc/s	500 metres	Core of L6/7/8 (osc.)
2	M.W.	1,500 kc/s	200 metres	TC3 (osc.) and TC1 (aerial)
3	Repeat operations 1 and 2			
4	L.W.	214 kc/s	1,400 metres	TC2 (osc.) and TC4 (aerial)
5	Check calibration			

The ferrite-rod aerial is unlikely to require adjustment but if necessary the former of the M.W. coil (L2) may with care, be adjusted with the chassis in the cabinet for maximum output with a 600 kc/s signal. TC1 should then be re-checked, with a 1,500 kc/s signal applied. The L.W. coil (L4) should not be moved.

OUTPUT STAGES

(Setting of RV3)

If any components of the output are replaced, it will be necessary to reset the bias control RV3 as follows:—

1 Connect the receiver to a 9 volt power supply.

2 Connect an Avometer 8 across R28, 4·7Ω (positive lead to chassis).

3 Set Avometer 8 to 50μA range, and switch on receiver.

4 With volume at minimum adjust RV3 for a meter reading of 7 on the 0-25 scale.

Check that the total quiescent current of the receiver is 14mA (±1·5mA).

Note: The above readings are dependant on ambient temperature and quoted figures are for an air temperature of 65°F (18°C). See table below for other conditions.

Temperature °C	Temperature °F	Reading on 0-25 scale	Total Iq
18	65	7	14mA
23	73	8·4	15·4mA
28	82	9·7	16·7mA
33	91	11·4	18·4mA

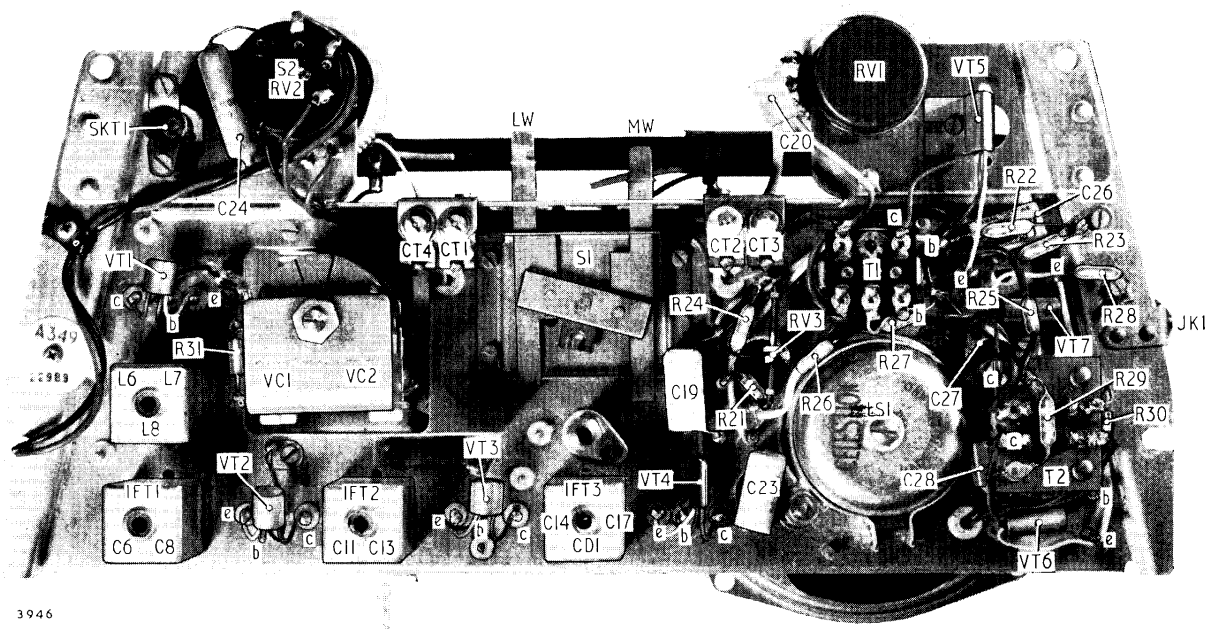


Fig. 1 *Back view of chassis*

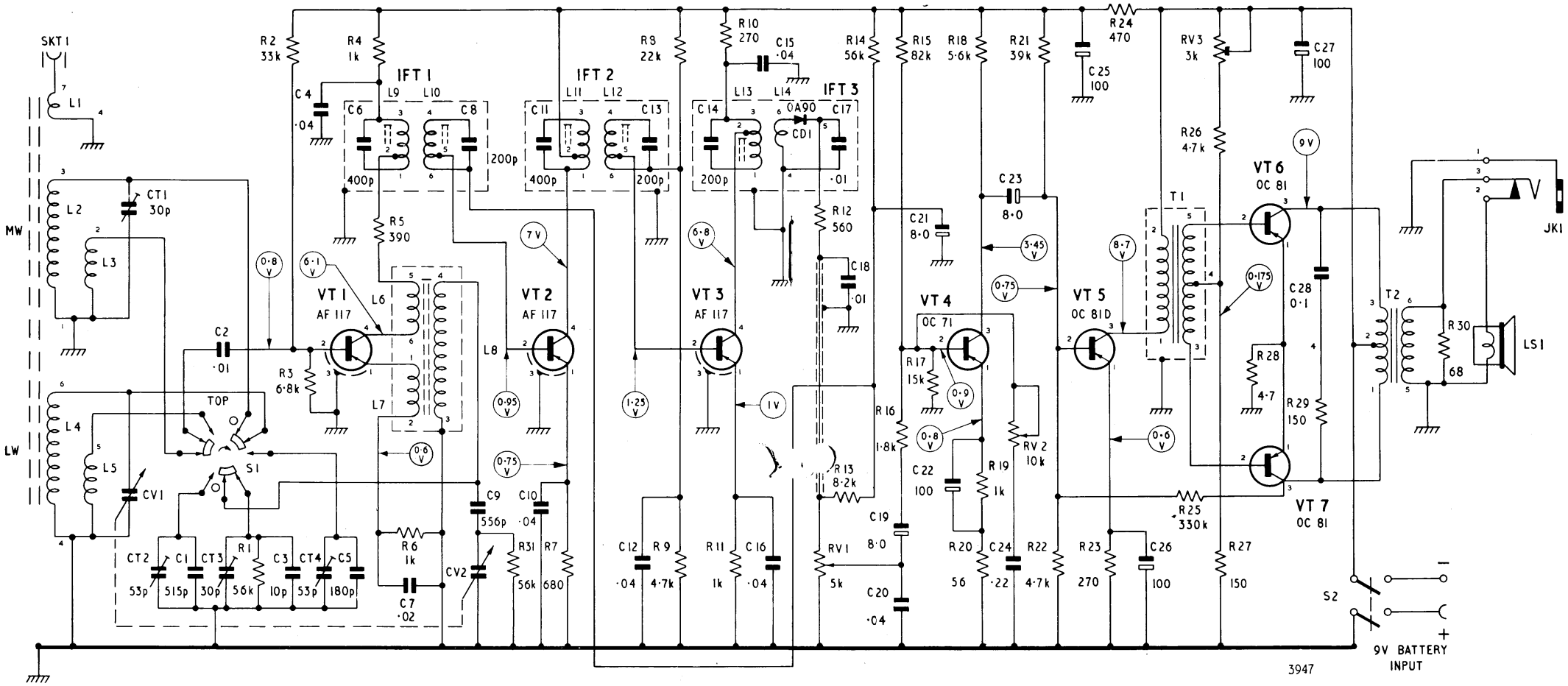
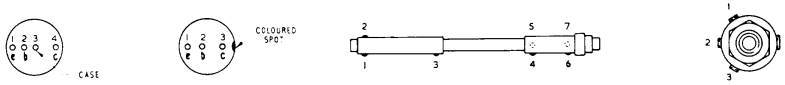


Fig. 2 *Circuit diagram*



BASES OF TRANSISTORS VT1-3

BASES OF TRANSISTORS VT4-7

FERRITE AERIAL L1-5

JACK SOCKET VIEWED FROM OUTSIDE OF CABINET

IFT BASES 1-3 VIEWED FROM BELOW

OSC COIL VIEWED FROM BELOW

DRIVER TRANSFORMER

OUTPUT TRANSFORMER

NOTES.

1. ALL VALUES OF RESISTANCE IN OHMS & ALL VALUES OF CAPACITANCE IN µF UNLESS OTHERWISE STATED.
2. VOLTAGES INDICATED ARE NEGATIVE WITH RESPECT TO CHASSIS & MEASURED WITH AVO No 8 UNDER NO SIGNAL CONDITIONS & WITH VOLUME CONTROL SET TO ZERO.
3. S1 SHOWN IN MW POSITION VIEWED FROM FRONT OF RECEIVER.

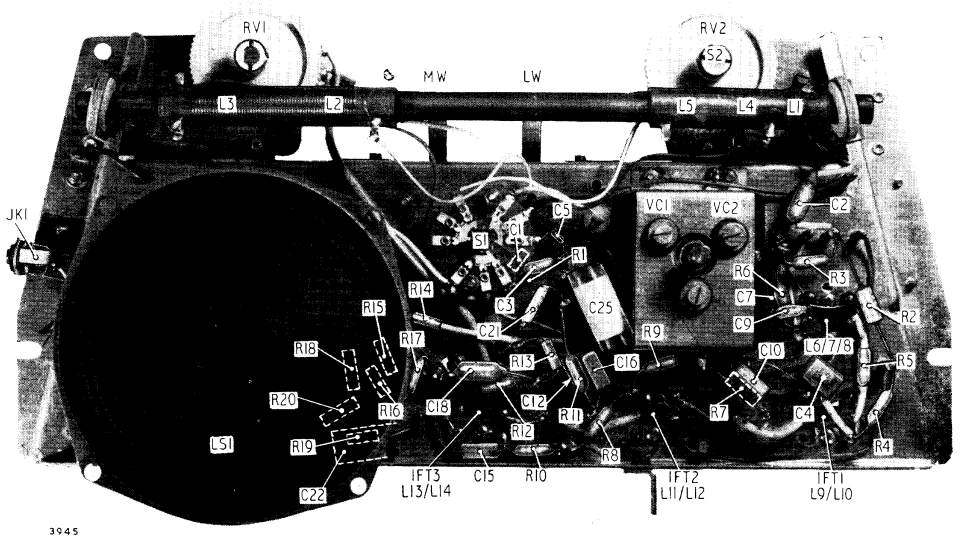


Fig. 3 *Front view of chassis*

PARTS LIST

Note: Ordering to these part numbers will give the right type and rating of component. When fitting replacements from stock always use the same type as that of the component being replaced.

CAPACITORS

Reference	Value µF	Value pF	Tolerance (±%)	Rating (volts)	Part Numbers
C1	—	515	2½	125	AP65789 or AP65790 or AP65791
C2	0·01	—	20	150	AP62651
C3	—	10	5	750	AP24629
C4	0·04-0·047	—	20	150-250	AP62985 or AP67542
C5	—	180	2½	125	AP64590, AP64591 or AP65701
C6	—	400	2½	125	AP64061, AP64076 or AP65700
C7	0.02	—	20	150	AP22251
C8	—	200	2½	125	AP65010, AP64075 or AP65703
C9	—	556	2½	125	AP64064, AP65721 or AP65720
C10	0·04-0·047	—	20	150-250	AP62985 or AP67542
C11	—	400	2½	125	AP64061, AP64076 or AP65700
C12	0·04-0·047	—	20	150-250	AP62985 or AP67542
C13	—	200	2½	125	AP65010, AP64075 or AP65103
C14	—	200	2½	125	AP65010, AP64075 or AP65103
C15	0·04-0·047	—	20	150-250	AP62985 or AP67542
C16	0·04-0·047	—	20	150-250	AP62985 or AP67542
C17	0·01	—	−25+50	12	AP67222
C18	0·01	—	20	150	AP62651
C19	8·0	—	−20+100	12	AP62173
C20	0·04-0·047	—	20	150-250	AP62985 or AP67542
C21	8.0	—	−20+100	6	AP64286
C22	100	—	−20+100	3	AP62171 or AP66013
C23	8.0	—	−20+100	12	AP62173
C24	0·22	—	10	125	AP29921
C25	100	—	−20+100	12	AP62170 or AP66012
C26	100	—	−20+100	3	AP62171 or AP66013
C27	100	—	−20+100	12	AP62170 or AP66012
C28	0·1	—	20	250	AP67502
CT1 & CT4	—	3–30 | 3–53	—	—	AP67539
CT3 & CT2	—	3–30 | 3–53	—	—	AP67539
VC1 } ganged VC2 }	—	523	—	—	CP63342 or CP62145

RESISTORS

Reference	Value (ohms)	Tolerance (±%)	Rating (Watts)	Part Number
R1	56k	10	¼	AP25372
R2	33k	10	¼	AP25354
R3	6.8k	10	¼	AP25306
R4	1k	10	¼	AP25246
R5	390	10	¼	AP25216
R6	1k	10	¼	AP25246
R7	680	10	¼	AP25234
R8	22k	10	¼	AP25342
R9	4·7k	10	¼	AP25294
R10	270	10	¼	AP25204
R11	1k	10	¼	AP25246
R12	560	10	¼	AP25228
R13	8·2k	10	¼	AP25312
R14	56k	10	¼	AP25372
R15	82k	10	¼	AP25384
R16	1·8k	10	¼	AP25264
R17	15k	10	¼	AP25330
R18	5·6k	10	¼	AP25300
R19	1k	10	¼	AP25246
R20	56	10	¼	AP25156
R21	39k	10	¼	AP25360
R23	270	10	¼	AP25204
R24	470	10	¼	AP25222
R25	330k	10	¼	AP25426
R26	4·7k	10	¼	AP25294
R27	150	10	¼	AP25186
R28	47	½ ohm	¼	AP63262
R29	150	10	¼	AP25186
R30	68	10	¼	AP25162
R31	56k	10	¼	AP25372
RV1	5k log.	20	1	BP67915
RV2	10k inverse log.	20	1	BP61950
RV3	3k lin	20	0·2	AP67503

COILS AND TRANSFORMERS

Reference	Description	Resistance (ohms)	Part Number
L1	Aerial coupling coil	0·8	DS62194 or DS63545
L2	M.W. ferrite aerial coils	0·5	
L3		less than 1·0	
L4		12·0	
L5	L.W. ferrite aerial coils	1·5	
L6		less than 1·0	CS67535
L7	M.W. & L.W. oscillator	2·0	
L8		less than 1·0	
IFT1	1st i.f. transformer	—primary 5·5	BS67525
		—secondary 8·5	
IFT2	2nd i.f. transformer	—primary 5·5	BS67525
		—secondary 8·5	
IFT3	3rd i.f. transformer	—primary 9·0	BS67526
		—secondary 1·5	
T1	Driver transformer	—primary 140	BS65498
		—secondary 55 + 60	
T2	Output transformer	—primary 2·5 + 2·5	CS65805
		—secondary less than 1·0	

MISCELLANEOUS

Description	Part Number TR.82C	Part Number TR.82D
Cabinet body, less trim	BS67530	BS67532
Cabinet back	AP62347	AP67227
Cabinet front, less trim	AP62346	AP64902
Cabinet, bezel	AP62336	AP62336
Cabinet, edge trim	AP62342	or AP67240
Control panel moulded	AP62348	AP67228
Felt strip for tuning knob	AP60607	AP60607
Handle	DP62349	DP62349
Knob, Long	CP60214	CP60214
Knob, Medium	CP60215	CP60215
Knob, Tuning	BS62437	BS62437
Knob, Volume or Tone	CP60204	CP60204
Long and Medium Knobs—metal connecting piece	AP62157	AP62157
Long and Medium Knobs, plastic connecting piece	AP62158	CP62158
Pointer	AP60276	AP60276
Tuning scale	DP60514	DP60514
Speaker (5 in. round) P.M.	CP67540	CP67540
Socket, Jack, miniature	BP65088	BP65088
Socket, aerial	AP61162	AP61162
Screw, back fixing	AP62359	AP62359
Switch wafer	AP62184	AP62184